

INVESTIGATION REPORT OF THE FIRE AT STOUFFER'S INN OF WESTCHESTER

Harrison, New York

JAMES R. BELL

On December 4, 1980, a fire occurred on the third floor of the conference facility at the Stouffer's Inn of Westchester, which was located in Harrison, New York. Of approximately 95 occupants who were attending meetings in several conference rooms, 26 persons lost their lives and 24 were injured. The fire did not involve guest-room facilities of the hotel complex.

The fire originated in an exit access corridor outside the meeting rooms in the three-story, fire-resistive,

This investigation was conducted by the NFPA under an agreement with the Federal Emergency Management Agency. It was jointly funded by the Federal Emergency Management Agency, the National Bureau of Standards, and the NFPA.

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nonsprinklered building that was classified as a place of assembly. In the early stages of the fire, meeting-room occupants were faced with rapidly deteriorating, untenable conditions that impeded their escape to safety. This fire emphasizes the importance of maintaining the integrity of exit access areas and the extreme hazard to life safety when fires originate in such areas.

The significant factors contributing to the loss of life in this fire were:

- the critical location of the fire in the intersection of the exit access corridors;

Below: The Conference Center from the southwest. The railings of the promenade deck and windows of the burned-out Common area of the third floor are above the slanted, glassed-in area housing the indoor swimming pool.

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- the rapid development of the fire through the combination of its origin and the available fuel load provided by contents and furnishings in the exit access;
- the lack of a remote second means of egress from some occupied meeting rooms; and
- the lack of a fixed fire protection system to detect and extinguish the fire in its incipient stage.

The NFPA investigated the Stouffer's Inn conference facility fire in order to document and analyze significant factors that resulted in the high loss of life. This study was conducted in cooperation with the Federal Emergency Management Agency/United States Fire Administration (FEMA/USFA) and the National Bureau of Standards (NBS) under a standing agreement with FEMA. This study was jointly funded by NFPA, FEMA, and NBS.

The National Fire Protection Association became aware of the Stouffer's Inn fire on December 4, 1980. James R. Bell, Legislative Technical Specialist in the NFPA's Washington, D.C., office, and David Moore,¹ Fire Protection Engineer in the NFPA Research Division, traveled to Harrison, New York, to document the facts related to this fire. This report was prepared by Mr. Bell based on four days of on-site study and subsequent analysis conducted by the NFPA. Entry to the fire scene and data collection activities were carried out with the cooperation of and through the Westchester County District Attorney's Office. This report presents the findings from the NFPA data collection and analysis effort.

The cooperation of Carl Vergari, Westchester County District Attorney, is greatly appreciated. The assistance and cooperation of Bill Leavy and Bryant Stevens of the New York State Department of Fire Prevention and

Control, and that of Assistant Chief Steve Surace, West Harrison Fire Department, and Tom Klem, Federal Emergency Management Agency/US Fire Administration, is also acknowledged. The assistance of A. Elwood Willey, NFPA Assistant Vice-President, Research and Fire Information Services, is acknowledged. Special thanks go to Mrs. Geraldine Noonan, Project Secretary, for her efforts in the preparation of this report.

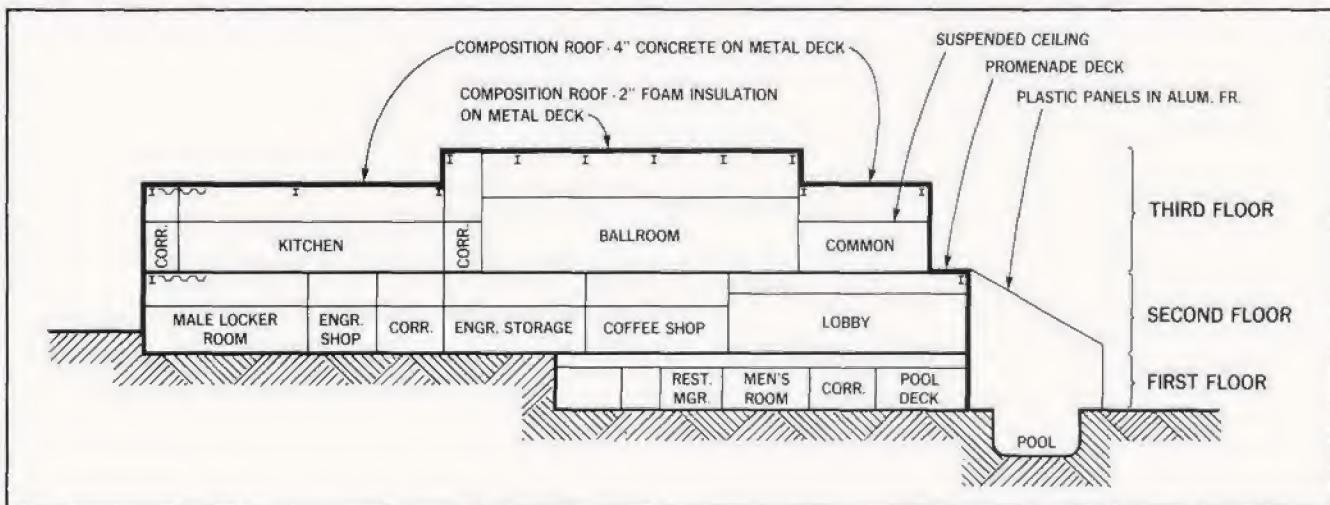
The objective of this report is to document and analyze a significant fire incident in order to prevent a recurrence of such multiple death losses in the future. The scope of this report is limited to those portions of the Stouffer's Inn conference facility pertinent to an examination of fire problems and factors associated with the loss of life. This report describes firesafety conditions at the Stouffer's Inn conference facility and presents findings on contributing factors to the loss of life based on the NFPA analysis of collected data and observations during the investigation. The NFPA has not analyzed the Stouffer's Inn conference facility as to compliance with the codes or standards that were in existence in Westchester County when the building was built or during its operation.

Due to the ongoing criminal investigation and subsequent indictment and civil litigation sensitivities, certain data were not available to the NFPA, including medical examiner's data on fire victims, certain ignition sequence details, access to witness statements, and sufficient information to permit development of a detailed time line of critical incident events. Additional information on this fire may exist that will further amplify aspects of the report.

During the period that this report was being developed, the NFPA was advised that litigation had been initiated concerning the fire at the Stouffer's Inn. It is not the NFPA's intention that this report pass judgment on, or fix liability for, the loss of life and property at the Stouffer's Inn.

¹ Mr. Moore is presently with the Mobile Research and Development Corporation, Princeton, New Jersey.

Figure 1. Section view through Ballroom. Drawing not to scale.



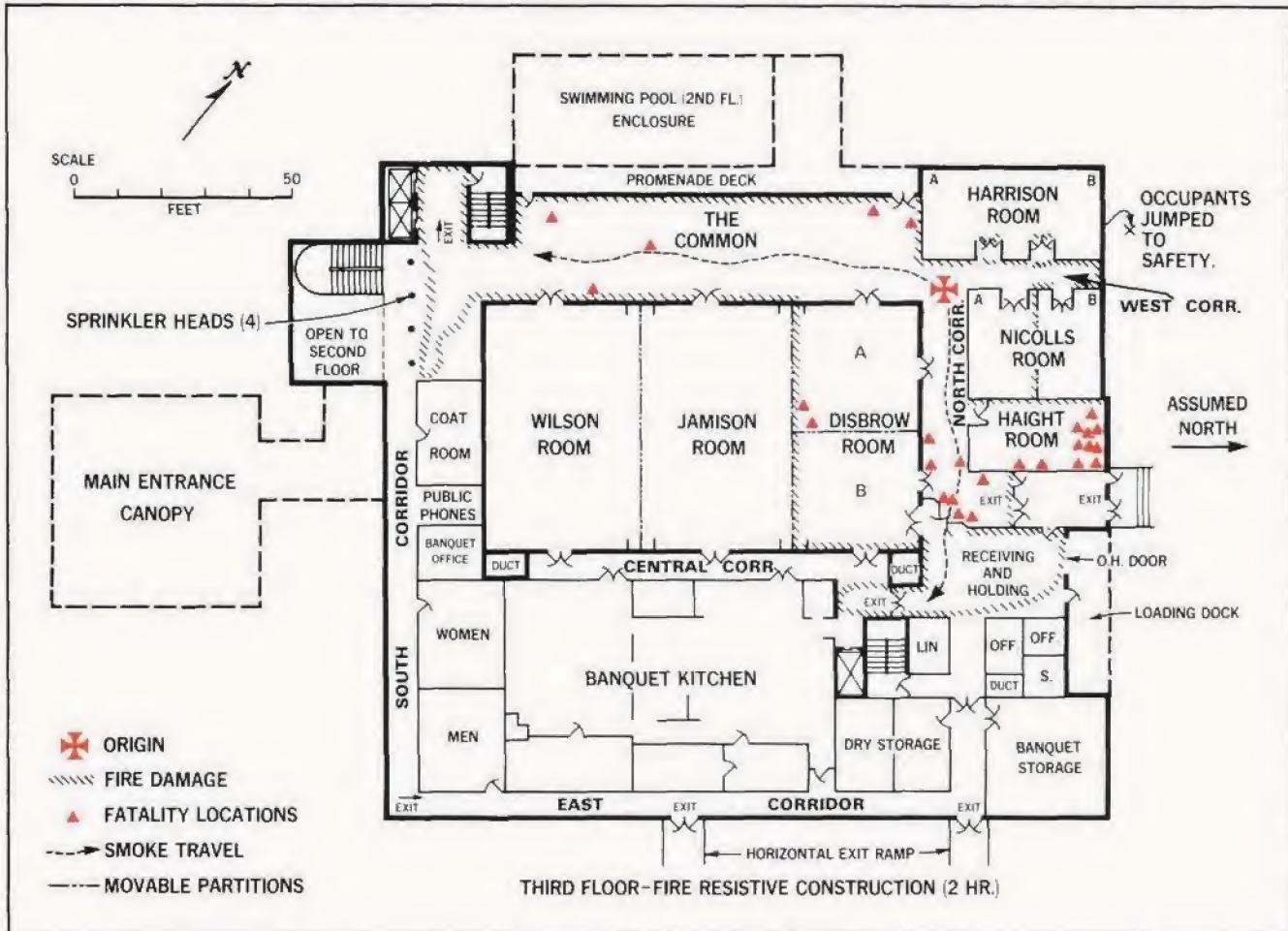


Figure 2. Layout of third floor.

BACKGROUND

The Building

The Stouffer's Inn of Westchester consisted of a 366-room luxury hotel, recreation facilities, and conference facilities, situated on 28 acres of landscaped woodland located 30 miles north of midtown New York City in the town of Harrison, New York. The hotel complex was located two miles from the business center of White Plains, New York.

Three connected four-story guest-room buildings were separated from the Main Building (which contained conference facilities) and a restored stone mansion by a small ravine. The guest-room buildings and the Main Building were connected by a 137-foot enclosed pedestrian walkway.

The building permit was issued in December 1975, and construction was begun at that time. A certificate of occupancy was issued in January 1978. The plans for the building had been reviewed by the New York State Building Codes Bureau and the town of Harrison based on the *New York State Building Construction Code*

Applicable to General Building Construction. Under this Code, the Main Building was classified as a C5-2, a public assembly building occupied by 600 to 1,500 people.

The three-story Main Building in which the fire occurred contained the registration desk, a restaurant, a coffee shop, lounge, pool, health club, small shops, and offices. The third floor, the floor of fire origin, contained meeting rooms, a ballroom that could be converted to additional meeting space by movable partitions, and the banquet kitchens, with ancillary service areas. The Common, a 24-foot-by-93-foot area that functioned as a lobby for the adjoining ballroom and as an accessway for other meeting areas, was located on the west side of the building. (See Figures 1 and 2 and Table 1.)

The conference facility Main Building in which the fire occurred was of fire-resistive construction. The exterior facade of the building consisted of both glass lights (panels) in aluminum mullions and masonry walls with a brick veneer. Structural steel was protected with sprayed-on mineral fiber insulation on beams and girders, concrete on spandrel girders, and enclosure of columns in gypsum wallboard assemblies, resulting in 2- or 3-hour fire-resistance ratings. Floor assemblies were of

Table I.
Meeting Room Dimensions

	<i>Rooms</i>	<i>Dimensions</i>	<i>Sq. Ft.</i>
A)	Grand Ballroom	56 ft. x 105 ft.	5880
	Wilson Room	56 ft. x 35 ft.	1960
	Jamison Room	56 ft. x 35 ft.	1960
	Dishbow Room	56 ft. x 35 ft.	1960
	Dishbow A	28 ft. x 35 ft.	980
	Dishbow B	28 ft. x 35 ft.	980
B)	Harrison Room	20 ft. x 42 ft.	840
	Harrison A	20 ft. x 21 ft.	420
	Harrison B	20 ft. x 21 ft.	420
C)	Nicolls Room	22 ft. x 31 ft.	682
	Nicolls A	11 ft. x 31 ft.	341
	Nicolls B	11 ft. x 31 ft.	341
D)	Haight Room	16 ft. x 24 ft.	384
E)	The Common	24 ft. x 93 ft.	2232

concrete slab on steel deck. The roof assembly of the third floor consisted of concrete slab on steel deck or two-inch foam insulation on steel deck; both were covered with a composition roof.

Corridor wall assemblies on the third floor of the conference facility varied in construction. Wall assemblies enclosing the Haight, Nicolls, and Harrison Rooms consisted of $\frac{3}{8}$ -inch type X gypsum wallboard on either side of steel studs to provide a 1-hour fire-resistive rating. However, the wall assembly enclosing the perimeter of the Grand Ballroom consisted of steel studs with $\frac{1}{2}$ -inch

gypsum wallboard (non-type X) on either side of the studs. In most locations, one layer of $\frac{1}{2}$ -inch fire-retardant treated plywood was included between the steel studs and the gypsum wallboard. The resulting wall assemblies would not meet specifications for a 1-hour fire-rated wall assembly.

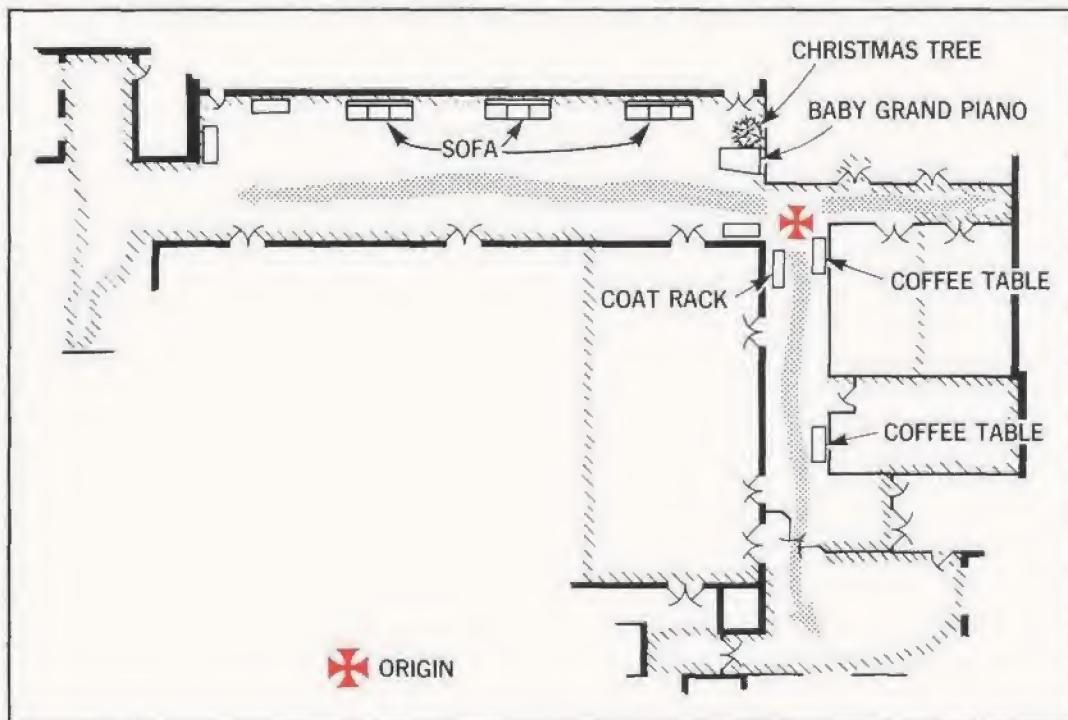
Doors leading from meeting rooms into The Common and corridors were of solid-core composite-type construction with a plastic laminated surface covering. Doors, door frames, and hardware would not provide fire-rated protection for openings in the wall assemblies.²

The interior finish in the public areas and conference rooms on the third floor consisted of vinyl wall coverings on gypsum wallboard. The wall areas at the opposite ends of The Common were made of brick. The suspended ceilings throughout the third floor were of mineral-fiber tile. Typical wall finish within the Grand Ballroom consisted of vinyl wall covering, painted wood decorative molding, and plastic laminated panels on gypsum wallboard on fire-retardant treated plywood panels over steel studs.

The floor coverings throughout the public areas of the third floor consisted of woven cut-pile carpet of 80 percent wool and 20 percent nylon, with jute backing and a

² Engineering report conducted by Lothrop Associates Architects, "Analysis of Building Code Compliance, Building A, Stouffer's Westchester Inn, Town of Harrison, New York," (issued July, 1981) for Westchester County.

Figure 3. Simplified representation of contents in North Corridor and The Common, plus smoke and flame spread (indicated by dotted pattern). Drawing not to scale.



fiber underlayment pad. This carpeting was continuous throughout the public areas on the third floor.

The Common area contained mixed furnishings that included sofas, two pianos, side tables, and lamps; an artificial Christmas tree was located against the wall at the north end of The Common (see Figure 3).³ There were two large, evergreen Christmas wreaths on the brick end walls of The Common. Five temporary tables had been installed prior to the fire to provide coffee service during meeting breaks. These folding tables were constructed of plywood with metal frames and legs, and were covered with cotton or linen tablecloths that extended to the floor.

A mobile coat rack was located next to the south wall of the North Corridor, several feet from the intersection of that Corridor with The Common. Approximately 40 to 60 outerwear garments may have been hanging on the rack on the morning of the fire.

Meeting rooms were equipped with stackable metal chairs padded with polyurethane foam and blended cotton/felt with vinyl coverings. Folding tables inside the rooms were covered with tablecloths.

The west wall of The Common consisted of glass in aluminum frames with open-weave curtains along the entire length of The Common.

The Common served as the focal point and key exit access corridor for the conference facility on the third floor and also as a lobby for the Grand Ballroom. The Common provided access to the Wilson Room, the Jamison Room, and the Disbrow Rooms, the designations for the meeting rooms that could be created within the Grand Ballroom by movable steel wall partitions. The Disbrow Room on the east end of the Ballroom could be further subdivided into two smaller meeting rooms, Disbrow Rooms A and B, by means of another movable steel wall partition. On the morning of the fire, the movable partitions had been extended to subdivide the Ballroom into four meeting areas, three of which were occupied at the time of the fire. (See Figure 2.)

The Common intersected with the North and West Corridors located in the north corner of the building. These corridors provided access to the additional, smaller meeting rooms (Disbrow A, Disbrow B, Harrison, Nicolls, and Haight).

The North Corridor was nine feet wide. It extended 43 feet from the intersection to a point where the corridor turned 90 degrees to the north, running an additional 11 feet to three 36-inch exit doors. These doors led to an 11-foot-by-21-foot enclosed exit foyer that had three 36-inch doors leading to a porch with two steps to grade. The North Corridor provided access to the single exit access door that served the Haight Room.

At the east end of the North Corridor, two 42-inch, B-labeled, 1½-hour fire doors protected the opening be-

tween the North Corridor and the Receiving and Holding Room. These doors were not provided with self-closing devices.

The West Corridor, which was six feet wide, extended 34 feet from the intersection with The Common and the North Corridor to the north exterior wall of the building. This created a dead-end corridor. The West Corridor provided access to the Harrison and the Nicolls Rooms, which were located on either side. Both the Harrison and the Nicolls Rooms could each be subdivided into two smaller meeting rooms by movable partitions. These rooms were designated by letters as Harrison A and B and Nicolls A and B. Each smaller subdivided meeting room was provided with a single exit access doorway.

A three-story enclosed exit stairway that discharged to the exterior at grade was located in the southwest corner of the building, opposite the elevators. A 40-inch, B-labeled, 1½-hour fire door with appropriate hardware, latching, and self-closer provided access to the 2-hour, fire-rated, exit stairway enclosure.

Exit access corridors extended along the south and east exterior walls of the building. The six-foot-wide corridors ran 220 feet, joining the third-floor landing at the monumental stairway and elevator lobby with the corridor from the Receiving and Holding Room. Two pairs of 36-inch double-leaf doors equipped with panic hardware provided the means of egress from the East Corridor.

Internally illuminated exit signs and directional signs were provided.

An open monumental stairway area between the lobby/registration desk area on the second floor and the conference facilities on the third floor was in a glass structure that extended from the south wall of the Main Building. The monumental stairway was 60 inches wide. The area on the second floor functioned as the main entrance to the hotel, and as the lobby and registration desk area. The driveway, main entrance canopy, the parking lots, and parking structure for the conference facility all could be reached most directly through this entrance.

The stairway landing and sitting area on the third floor was open to and overlooked the lobby area below. The open area between the floors was partially protected by sprinklers supplied by the domestic water system. Four 160° ½-inch pendent sprinklers were located so that they extended across the face of the opening into each of the two floors. In addition, a draft curtain was installed on the second floor to provide heat banking for the four sprinklers on this floor.

Glass doors in aluminum frames at either end of The Common allowed access to the Promenade Deck. There was a single-leaf door at the south end of The Common and double-leaf doors at the north end. Both doorways were provided with a key-operated deadbolt locking mechanism on the interior side of the doors and a thumb latch on the exterior side. The Promenade Deck ran the

³ This configuration is based on the best data available at the time of the NFPA's field investigation.

full length of The Common and had a small deck area extending from the building over the enclosed pedestrian walkway that overlooked the sloping swimming pool enclosure. There was no means of egress from the deck area. Since these doors were not considered exit doors and did not lead from the building to a public way, they were not marked with exit signs and were not required to be maintained in an unlocked condition.

On the east wall of the Grand Ballroom there were three exit access doorways marked with internally illuminated exit signs. These doorways provided additional exit access to remote exits for the Ballroom or for the enclosed individual meeting rooms when the Ballroom was subdivided by movable wall partitions. The doorways discharged into an exit Central Corridor approximately 6 feet wide and 97 feet long with a common path of travel and discharged into a Receiving and Holding Room. Doors from the kitchen also discharged into this corridor. The Receiving and Holding Room was used to receive and store supplies for the conference facility and kitchens. The loading dock on the exterior of the building adjoined the Receiving and Holding Room. Access to the loading dock was provided by a 10-foot-wide, roll-up overhead door and through a single 40-inch door marked with an exit sign. Steps led to grade from the loading dock.

A doorway with a pair of 36-inch, B-labeled, 1½-hour doors on the east side of the Receiving and Holding Room provided access to the East Corridor and exit ramps. A single B-labeled, 1½-hour door located adjacent to the overhead door connected to the exit foyer of the North Corridor.

The Main Building had zoned HVAC (heating, ventilation, and air-conditioning) systems with several individual roof-mounted units. Ionization-type smoke detectors were installed in return-air ducts of each of the

The Common, looking north toward the area of fire origin. Exit access door to the Wilson Room in the Grand Ballroom is at right. NFPA



HVAC systems. The detectors were arranged so that upon activation, the HVAC systems would shut down. Inspection of the alarm system by observers after the fire indicated that seven detection circuit modules had been disconnected, which apparently impaired some HVAC-duct smoke detectors. However, none of the disconnected circuits appeared to serve the third floor of the conference facility (the floor of fire origin). Fire dampers with fusible links were installed in ducts, which penetrated 2-hour fire-rated walls, vertical shafts, and floor slabs. Dampers were not installed where ducts penetrated 1-hour rated or nonrated walls or partitions.⁴

The Common also had baseboard hot-water heat installed at the base of the glass wall along the west side of The Common. Supplemental (electrical) heating could be provided by the roof-mounted units that were controlled by a thermostat located within The Common.

The local fire alarm system consisted of manual pull stations arranged to sound evacuation alarm bells in corridors. In addition, an evacuation alarm bell was centrally located in the Grand Ballroom, adjacent to the Central Corridor. Signals from the manual pull stations and HVAC system smoke detectors were transmitted to the annunciator panel adjacent to the registration desk; they indicated the zone activated and sounded a bell at the annunciator panel.

The system was arranged to sound evacuation alarm bells upon activation of manual pull stations or HVAC system smoke detectors. A bell silence switch at the annunciator panel could be used to silence the bell at the annunciator panel and the evacuation alarms.⁵

Public Protection

The town/village of Harrison, which is located in Westchester County, had a population of approximately 42,000 within its 19.5-square-mile area. The Town of Harrison, as an incorporated political entity, encompasses all of this area except for the Purchase Fire District, which remains unincorporated. The Stouffer's Inn site was located within the Purchase Fire District. The Purchase Fire Department is a totally volunteer department with dispatch and communications provided by the Town of Harrison Police Department over a municipal radio frequency that serves all of the town's services.

Activities of the Occupants

On the morning of the fire, five conferences were in progress on the third floor of the Main Building. Approximately 95 occupants were attending meetings in six of the conference facility's nine meeting rooms.

⁴ Lothrop Associates Architects' Report.

⁵ Ibid.

Forty-two persons were registered to attend a seminar being held by the United States Brewers Academy in the Wilson Room. Twenty-two employees of the Nestles Company, Inc., of White Plains, New York, were attending a seminar in Disbrow Room A, and six employees of the Pepsico Company of Purchase, New York, were meeting in Disbrow Room B.

Eleven employees of General Foods, Inc., of White Plains were meeting in the Harrison Room using both sections A and B. Thirteen executives of the Arrow Electronics Company of Greenwich, Connecticut, were holding a finance meeting in the Haight Room. Electronics equipment of the Arrow Corporation had been set up in Nicolls Room A.

Conference facility kitchen and service employees were also on the third floor in varying numbers before the fire occurred.

Weather Conditions

According to information obtained from the Westchester County Airport, weather conditions in Harrison, New York, between the hours of 8:00 am and 11:00 am on December 4, 1980, were as follows:

Conditions	Temperature (°F)	Humidity	Wind (mph)
Clear	23°	dry (2° dew point)	W 16

THE FIRE

Discovery of the Fire

As determined by local investigators, the fire was of incendiary origin and involved a flammable liquid on the carpet in the vicinity of the intersection of The Common and the North Corridor. The fire developed rapidly, extending into The Common and the adjoining corridors and exposing those areas to heavy smoke and heat. At approximately 10:20 am, witnesses discovered the fire while it was still in its incipient stages.

The fire alarm system annunciator panel and alarm bell in the hotel telephone operator's room behind the registration desk on the second floor apparently indicated alarm conditions several minutes after the fire began. The operator pressed a bell silence switch and then called the security office, which was located on the third floor adjacent to the Receiving and Holding Room. The bells activated again, and the annunciator board indicated an alarm status on several zone indicator lights. The fire alarm evacuation bells then sounded in the Main Building.

The chief building engineer was on the first floor when fire alarm bells were heard. He ran upstairs to the second-floor telephone operator's room. The light array on the board indicated an alarm situation on the northwest corner of the third floor. He took an extinguisher

and made his way to the third floor, where he found heavy smoke.

The chief engineer also attempted to shut down the HVAC systems by shutting off all power in the building. With the normal power supply shut down, the 145-kw emergency generator activated. The generator also was shut down.

Fire Department Response and Operations

At 10:23 am, the hotel telephone operator telephoned the alarm to the Harrison Police and Fire Dispatcher. The Purchase Fire Department was dispatched and responded with Engine 239, Engine 238, Ladder 53, and Utility 10. A police officer who was near the scene notified the Dispatcher that heavy smoke was showing; therefore, the West Harrison Fire Department was also dispatched and responded with Engine 265 and Engine 52 under a mutual-aid agreement. A ladder company was requested from the Port Chester Fire Department and an engine company from Harrison was requested for self-contained breathing apparatus and manpower.

When fire department personnel arrived at 10:28 am, the North and West Corridors, The Common, Disbrow Room A, and the Receiving and Holding Room were already heavily involved in fire. Prior to the initial fire attack, the windows of The Common had broken, allowing the fire to vent. An assistant chief and fire fighters from first-arriving Engine 239, positioned at the rear loading dock, began to attack the fire with a booster line and two 1½-inch preconnected handlines directed into the Receiving and Holding Room through an overhead door. A 2½-inch line from Engine 239 was later used through a rear exit door. Fire fighters made an attempt to rescue occupants of the Haight Room, but were unable to make their way to the room. They entered the room later when fire fighters were able to breach a hole through the gypsum wallboard and steel stud wall in the exit foyer. This breaching, which was initiated by the chief building engineer, was completed by fire department personnel.

Fire fighters from Engine 265 stretched a 2½-inch supply line from the hydrant located at the main entrance. This hydrant was found to have different threads on its two 2½-inch outlets, which caused some delay in supplying Engine 265. A 1½-inch line from Engine 265 was taken through the main entrance rooms and up the monumental stairs. Later, a second 1½-inch handline was positioned parallel to this line and a 2½-inch line was stretched as a backup, but was never used. The assistant fire chief of West Harrison, in command of a 1½-inch attack line, reported that sprinklers were operating and that it was difficult to advance past the sprinkler discharge because of smoke and heat in The Common. As the crew advanced toward the north end of The Common, suspended ceiling tiles dropped down on them.

A 1½-inch line was removed from Engine 52 and taken to the northeast rear exit, but was not used. A ladder pipe was set up, but it was not used. The occupants of the Harrison Room had evacuated through the window before fire department personnel arrived.

Attempts to ventilate the roof were unsuccessful due to the concrete-slab-on-steel-deck and concrete slab construction of the roof areas supporting HVAC equipment. Approximately 25 to 30 minutes after the ignition of the fire, a backdraft explosion occurred in the roof area over the Grand Ballroom area. The explosion reportedly was of sufficient force to lift the roof, dislodge brick on the exterior of the wall, and crack the concrete encasing spandrel beams of the steel structural framing. Fire fighters who were on the roof at the time, seeking a way to ventilate the roof, were shaken by the explosion. They pulled the dislodged course of brick from the wall, providing ventilation along the north and east perimeter wall.

The four sprinklers activated and stopped the horizontal fire travel at the open lobby and monumental stairs. Fire fighters, using handlines, extinguished the fire approximately 45 minutes after their arrival.

Fire department personnel began to remove the bodies before the precise locations of the bodies were noted and before the arrival of the District Attorney's Special Investigator.

Evacuation of the Occupants

• Disbrow Room A

The occupants of the Disbrow Room A were sitting at tables facing the podium, which was located along the south wall of the room. The executives seated in the room first noted smoke and flames extending under or through the cracks of the double doors leading to The

The wall between the Haight Room and the north exit corridor. Rescuers breached the wall in an effort to save the occupants. NFPA



Common. The speaker, a consultant, directed the occupants to remain calm and to move to the other set of doors, which led to the North Corridor.

They opened the double doors leading to the North Corridor and found that the corridor was filled with smoke. As they filed from the room into the North Corridor, the fire in the corridor extended rapidly toward them. Reportedly, the last surviving occupant observed fire extending over his head as he entered the corridor from the Disbrow Room A. Occupants groped along the floor of the corridor along the south wall, moving away from The Common, looking for the exit.

A hotel employee, who was working in the rear loading area, entered the North Corridor exit foyer adjacent to the Haight Room from the Receiving and Holding Room. When he entered the foyer, he saw smoke seeping through the cracks of the interior set of fire doors. He opened the interior door and saw thick, black, acrid smoke already banked down from the ceiling to within four feet of the floor. Stepping into the corridor, he saw the occupants searching for the exit. As the smoke began to affect him, he grabbed two of the people in the corridor, opened the double doors leading to the Receiving and Holding Room, and stumbled into that room.

He crossed the room and located the button that activated the roll-up overhead door. With the door open, he led the group out onto the loading dock. Affected by the smoke, he vomited and attempted to catch his breath in the fresh air. Because the telephone at the security desk was ringing, he reentered the Receiving and Holding Room. Bending over to avoid the black smoke that was filling the room, he opened the door to the security office and entered the room. The telephone operator informed him of the alarm status of the annunciator board and said "All the alarms (are) going off." He told the operator, "That's right — there's a fire back here." The operator called the Harrison Police/Fire Dispatcher and reported a fire in the loading dock area of the building. The initial response of the fire department was made to the rear loading dock.

Four of the occupants of the Disbrow Room A apparently left the room through the doors leading to The Common, and the bodies of these four were later found there. In addition, the bodies of two occupants were also found in Disbrow Room A. Six of the occupants who were the last to leave the Disbrow Room A and enter the North Corridor succumbed to the deteriorating conditions in the corridor.

• Disbrow Room B

In the Disbrow Room B, the six occupants of the meetings room were alerted to the fire by the noise and yells of "Fire" when the group from Disbrow Room A entered the North Corridor. As heavy smoke broke through the ceiling of their room, they entered the central exit corridor through the doors along the east wall. After entering the corridor, they exited past the kitchen into the



Corridor wall construction between Disbrow Room A and The Common, viewed from The Common.

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Receiving and Holding Room, which was filled with heavy smoke. After they exited onto the loading dock, the Receiving and Holding Room became fully enveloped in flame.

• *The Wilson Room*

The occupants of the Wilson Room learned of the fire when one of the occupants noticed black smoke curling in around the doors from The Common. All but two of the occupants left the room by way of the double doors leading into The Common. Black smoke had already extended down the length of The Common. As the occupants left the Wilson Room, they turned south and in the

The Harrison Room, looking toward the north. Occupants of the room broke out the glass with a folding table and jumped to the ground 15 feet below.

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direction of the monumental stairs. Those who were at the head of the line had been able to leave the room standing erect. As the conditions deteriorated, each person moving through the door was forced to bend lower and closer to the floor. When he reached the exterior of the building, one of the occupants who was toward the end of the line noted that the back of his neck was wet. Leaving the third floor, the occupants had passed beneath the third-floor sprinklers, which had already been activated by heat traveling the length of The Common.

One of the last occupants to leave the Wilson Room apparently became disoriented in the smoke. After reaching The Common, he turned right, toward the origin of the fire, and succumbed to the conditions.

Two other occupants used the doors leading to the Central Corridor and were able to escape through the kitchen. The "exit" sign for that exit access door was blocked from view by a large projection screen.

• *The Harrison Room*

Eleven occupants were meeting in the Harrison Room in the northwest corner of the building. One of the occupants smelled smoke and opened the door to the dead-end corridor; smoke rolled into the room. The door was then closed.

With heavy black smoke filtering through cracks in both sets of doors, occupants were forced to break tempered glass window lites (panels). They made several attempts to break the glass, using chairs and a folding table. The occupants were finally able to break the glass on the north wall of the room by using a table as a battering ram. They jumped approximately 15 feet to rocky, uneven grade below, sustaining laceration and fracture injuries.

• *The Haight Room*

Thirteen executives were meeting in the Haight Room, which had a single door opening to the corridor and no windows. A closet four feet deep was located along the north end of the room.

The occupants of the Haight Room apparently became aware of the fire during or after the rapid deterioration of conditions in the corridor. The corridor access door had evidently been opened and was left in the open position. Two occupants of the room entered the corridor and succumbed to conditions there. Eleven occupants remained in the room. Six occupants apparently took refuge in the 4-foot-by-16-foot closet, where they died. Five others died in the room.

Casualties

Twenty-six occupants of the third floor at the time of the fire died and twenty-four others were injured. (See Table 2.) Five fatalities were found in The Common, with indications that at least two persons died while at-

Table 2.
Occupant Summary

Meeting Room	Number of Occupants	Number Escaped	Fatalities			
			In Room	The Common	North Corridor	Total
Disbrow A	22	10	2	4	6	12
Disbrow B	6	6	—	—	—	—
Wilson Room	42*	41	—	1	—	1
Harrison Room	11	11	—	—	—	—
Haight Room	13	0	11	—	2	13
Nicolls Room	1	1	—	—	—	—
Totals:	95	69	13	5	8	26

* Number of occupants registered for a meeting in the Wilson Room; the Number Escaped assumes all occupants were in the room at the time of the fire.

tempting to escape by means of the locked promenade access doorways. Four of the five fatalities were occupants of the Disbrow Room A who had attempted to escape through the exit access door located on the west wall of the room, which led to The Common. The fifth fatality was an occupant of the Wilson Room who had apparently turned right in The Common after leaving the Wilson Room with others in that group.

Eight bodies were located in the North Corridor. Six of the 22 occupants of the Disbrow Room A who had attempted to reach safety by means of the North Corridor succumbed in that corridor. Their bodies were located in nearly single-file fashion, the manner in which they had left the Disbrow Room A and attempted their escape in the corridor. Two additional victims were found in the North Corridor, a few feet from the doorway to the Haight Room. These occupants of the Haight Room had attempted to escape by using the corridor.

Eleven occupants of the Haight Room had remained in the room. Six of these occupants had apparently taken refuge from fire conditions that were entering the room

The Haight Room, where 12 executives were trapped when the one doorway into the corridor was blocked by fire conditions. Six of the occupants were found in the closet at left (see arrow). NFPA



by taking refuge in a storage closet. Five of the fatalities were found in the meeting-room area.

The bodies of two victims were also located in the southeast corner of the Disbrow Room A; they had been occupants of that room.

Fire Damage

Severe fire damage was sustained in The Common, Disbrow Rooms A and B, both corridors, and the Receiving and Holding Room. Heat had extended into the Harrison Room, but the room was clear of severe fire damage, as were the Nicolls Rooms A and B and the Wilson Room. The Jamison Room received some heat damage. Heavy smoke conditions extended throughout the floor in areas that were not directly exposed to the fire.

ANALYSIS

Discussion

As determined by local investigative authorities, the fire was of incendiary origin, involving the ignition of flammable liquid on the carpet in the vicinity of the intersection of The Common and the North and West Corridors. A suspect, who had been employed by the hotel as a busboy and coffee steward at the time of the fire, was arrested following a four-month investigation by the Westchester County District Attorney's Office and was indicted by a Westchester County Grand Jury.

Information on the amount and type of accelerant that had allegedly been used to start the fire was not available to the NFPA because of the ongoing criminal investigation and the indictment. Within the immediate area of this location was a mobile coat rack with between 40 to 60 outerwear garments hanging vertically from hooks, plus two portable, folding wooden tables with cotton tablecloths on which coffee and Danish rolls had been placed. (See Figure 3.) The fire on the third floor rapidly extended to these items. In conjunction with the liquid fuel present on the floor of the corridor, this fuel load was sufficient to provide for a rapid build-up of heat under the nine-foot suspended ceiling in the vicinity of the point of fire origin. The intense fire growth in this area was sufficient to contribute to the spread of fire from the area of origin and the rapid movement of smoke in The Common and in the intersecting corridors.^{6,7}

Under the nine-foot-high mineral-tile suspended ceiling, direct radiated heat energy from the products of combustion preheated and provided rapid ignition of

⁶ Interior Finish and Fire Spread, NFPA SPP-47, NFPA, Quincy, Mass., 1977, pp. 113-140.

⁷ J. G. Quintero, A Characterization and Analysis of NBS Corridor Fire Experiments in Order to Evaluate the Behavior and Performance of Floor Covering Materials, NBSIR 75-691, National Bureau of Standards, June 1975.

combustible furnishings, wall covering, carpeting, and decorations in The Common.⁸ Although furnishings in The Common were "sparse," there was sufficient fuel loading to allow additional burning in that area. The extension of burning beyond the south end of The Common was limited by the domestic sprinkler protection.

In addition to the fuel contributed by furnishings in The Common and North Corridor, the vinyl wall covering also burned. In some locations, vinyl wall covering had delaminated from the gypsum wallboard; delamination of the vinyl wall covering could alter its burning characteristics.⁹

The heavy fire conditions in The Common may have been of relatively short duration. Due to the limited fuel available, the fire in The Common may have rapidly consumed most of the available fuel. The windows along the west side of The Common were broken out by the fire, allowing ventilation of products of combustion. Witnesses indicated that the rolling flames that issued from these windows soon after discovery of the fire quickly abated within a matter of minutes.

The products of combustion and flame front also were able to extend in both the North and West Corridors. The doors leading from the North Corridor into Disbrow Room A had been left in the open position during and after the escape attempts of the occupants. Fire was therefore able to enter Disbrow Room A. Fuel for an extensive fire build-up in this room was provided by the furnishings — tables and urethane foam-padded chairs with a vinyl fabric covering — and decorative interior finish, which included vinyl-covered fabric, plastic surface panels, vinyl wall coverings, and wood molding. The



The Common, looking south from the area of fire origin. Exit access doorway from Disbrow Room A to The Common is in the center. NFPA

method of extension of fire into Disbrow Room B was not determined; however, this room also became heavily involved in fire. Disbrow Rooms A and B were both heavily involved during fire-fighting operations, well after initial smoke spread and fire growth in the exit access corridors.

The roof area above the Grand Ballroom that encompassed Disbrow Rooms A and B was raised above the roof areas over the rest of the floor. This raised roof area, surrounded by masonry walls and steel deck, foam insulation, and composition roof, allowed products of combustion to accumulate. The HVAC system servicing this area had shut down upon activation of the smoke detectors in the return-air duct.

Approximately 20 to 30 minutes after the fire began, a "rumbling" explosion in this area caused the roof to rise and the course of brick on the north and west walls of the raised roof area to separate from the building. Fire fighters on the roof pulled the course of brick from the wall. The openings in the wall at roof level provided ventilation. Explosion-related damage to the corridor wall assembly on the north and west corner of the Disbrow Room A, which separates the Grand Ballroom from The Common and the North Corridor, corresponds to the damage done to the exterior masonry wall sections immediately above Disbrow Room A.

The door between the Haight Room and the North Corridor had most likely been opened and left in the open position during the fire. Fire was able to enter the Haight Room, although direct flame damage within the room was limited. By contrast, the doors to the Harrison Room had been left closed during the fire; there was some fire penetration through the door, but only light heat and smoke damage were evident in the room.

The B-labeled, 1½-hour doors between the Receiving and Holding Room and the North Corridor were not provided with self-closers. When a hotel employee had opened the doors, during his rescue of the occupants of

⁸ Carpet and underlayment pad samples from the third floor of the Stouffer's Inn of Westchester's Main Building were tested by NBS in accordance with ASTM E-648 (NFPA 253), *Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using A Radiant Heat Energy Source*.

Two samples of carpet and underlayment tested provided "high" Critical Radiant Flux values. (Critical radiant flux is that level of external irradiance below which the flame will not continue to spread.) The carpet removed from the third floor of the Main Building would be acceptable for use in hospitals and health care facilities; a CRF (critical radiant flux) of 0.5 W/cm² or better is generally accepted for these (health care) occupancies. Other regulated occupancies, such as commercial and residential buildings, require a value of 0.25 W/cm² for carpet used in corridors and exitways.

⁹ Vinyl-covered gypsum wallboard samples from the third floor of the Stouffer's Inn of Westchester, Main Building, were tested by NBS in accordance with ASTM E-162, *Standard Method of Test for Surface Flammability of Materials Using A Radiant Heat Energy Source*. Test results are reported in terms of a flame spread index. This test method does not correlate well with NFPA 255 (ASTM E-84), *Method of Test of Surface Burning Characteristics of Building Materials*, which is used to determine flame spread classification for code compliance; however, ASTM E-162 results are useful for research purposes.

Two samples of vinyl-covered wallboard tested provided "low" flame spread index values. The two samples had flame spread values of 7.0 and 7.5, respectively, for an average flame spread index of 7.2, which appears to be within the range of values for Class A interior finish (0-25). During testing, both specimens exhibited bubbling prior to ignition. Ignition occurred when bubbles popped and released combustible gases. The samples were not tested for smoke developed.

Disbrow Room A who had entered the corridor, the doors had been left in the open position. The heat and smoke were able to flow into the Receiving and Holding Room. This area quickly became untenable as fire from the North Corridor quickly extended into it.

The B-labeled, 1½-hour doors between the Receiving and Holding Room and the Central Corridor and kitchen entrance were provided with self-closers. However, at the time of the fire, the doors were blocked open with compressed gas cylinders for soft drinks. Fire was able to extend into this area, jeopardizing the central exit access corridor and the pathways to exits.

Along with The Common, the North and West Corridors provided the primary exit access in the building. Witnesses indicated that deterioration of tenable conditions in these areas allowed a very limited amount of time for occupants to become aware of the fire and escape. Information permitting detailed analysis of the time between the ignition of the fire in the intersection and its initial discovery was not available to the NFPA. However, the fire had been seen initially by witnesses while it was still relatively small, when smoke conditions were limited to the area of fire origin. Based on statements of witnesses, in approximately two minutes, fire had extended from the point of origin and had made the exit access untenable. The rapid development of the fire and deterioration of conditions in these corridor areas limited the escape of the occupants in all of the rooms on the third floor, which were then in use for meetings.

Most of the occupants became aware of the fire when smoke began to enter their meeting rooms, or as a result of the noise made when others in adjoining rooms initiated their own escape attempts. These cues were the first means of alerting meeting-room occupants and, prior to the sounding of evacuation alarms, occupants of all of the meeting rooms had to face entering hostile corridor conditions in order to escape.

Due to the delay in receiving an early warning or alarm of the fire, the occupants' first awareness of the fire was brought about by the fire conditions themselves. Because of the rapid build-up of the fire and the deterioration of the environment in the exit access, the time needed for escape was greater than the time available. The escape sequences of the occupants occurred well before the arrival of fire department personnel at 10:28 am, and most likely before the fire department had been notified of the fire by the hotel telephone operator.

Fire Alarm System Performance

Fire alarm bells did not activate on the fire floor during the initial stages of the fire. Occupants of the third-floor meeting rooms learned of the fire by observing smoke entering the meeting room, or by hearing sounds associated with the escape efforts of other occupants of the floor.

Fire alarm bells did sound in the building; however,

activation of the alarm system most likely occurred after occupants had discovered the fire and had initiated their escape attempts. By this time, however, as observed by witnesses, conditions within The Common and the corridors were rapidly deteriorating or had deteriorated to the point where the environment was already untenable. Staff members in other parts of the building were alerted to the fire by the alarm bells.

The primary fire alarm system activation devices for the conference facility were the manual pull-box alarm stations. A total of three manual pull stations on the second and third floors had apparently been pulled during the fire, although the time of their activation could not be determined.

Smoke detectors located in the ducts of the HVAC system apparently did activate and were most likely responsible for the initial alarm signals received at the annunciator panel and for activation of the evacuation alarm. The smoke detectors installed in the ductwork of the HVAC systems that serviced the public building were intended to provide for fan shutdown. The operational status of the HVAC system and related smoke detectors following the fire was not determined by the NFPA.¹⁰ The Main Building was not provided with a complete smoke detection system.

¹⁰ NFPA 90A-1978, *Standard for the Installation of Air Conditioning and Ventilation Systems*, outlines the function of HVAC duct smoke detection as follows:

"4-3.2 Except as required by provisions of 4-2, in systems of over 15,000 cfm (7080 L/sec) capacity, smoke detectors approved for duct installation shall be installed and arranged to automatically shut down fans. For this purpose, the detectors shall be provided as follows:

(a) at a suitable location in the return air stream prior to exhausting from the building or being diluted by outside air, and

(b) at a suitable location in the main supply duct on the downstream side of the filters."

In systems of 15,000 cfm (7080 L/sec) capacity and under, effective means of detecting and controlling the spread of smoke in air conditioning systems is recommended in premises where the panic hazard is pronounced or where there are valuable contents particularly subject to smoke damage.

The protection provided by the installation of smoke detectors and other requirements of Paragraph 4-3.2 is intended solely to prevent the distribution of smoke through the supply air duct system. This in itself will not guarantee either early detection of fire or the detection of smoke concentrations prior to dangerous smoke conditions if smoke movement is other than through the supply air system. Where facility smoke control protection is determined needed, a specifically designed smoke control system including location of smoke detectors at locations that will assure early detection of developing smoke conditions and initiation of the smoke control measures should be provided.

"4-4 Detectors. Heat and smoke detectors required by the provisions of this standard shall not be construed as a substitute for complete area protection afforded by an approved detection system, as prescribed in NFPA standards for fire alarm signaling systems. When such an approved detection system is installed in the building, the heat or smoke detectors required by provisions of 4-3.2 (above) shall be connected thereto in accordance with the requirements of NFPA 72E, *Standard on Automatic Fire Detectors*, so that actuation of any heat or smoke detector will sound the fire alarm as well as provide the function of controlling the ventilation systems."

Sprinkler Performance

The four sprinklers, which provided protection for the vertical opening between the second and third floors, were activated by heat extending down The Common ahead of the flame front. Sufficient heat traveled the length of The Common and fused the sprinklers on the third floor prior to the evacuation of all of the occupants from the Wilson Room. The waterspray from the four sprinklers across the opening of the stairway prevented continued spread of fire from The Common to the South Corridor.

SUMMARY

Based on the NFPA investigative study, the following are considered to be the major factors contributing to the loss of life in this fire:

- the critical location of the fire in the intersection of the exit access corridors;
- the rapid development of the fire through the combination of its origin and the available fuel load of contents and furnishings in the exit access;
- the lack of a remote second means of egress from some occupied meeting rooms; and
- the lack of a fixed fire protection system to detect and extinguish the fire in its incipient stage.

In this incident, with the origin of the fire in the means of egress and the rapid deterioration of conditions

in the exit access, the occupants were faced with initiating escape in an environment that was rapidly becoming untenable at the time of fire discovery. Even if there had been earlier detection of fire conditions and notification of occupants through activation of alarm systems, the meeting-room occupants would have been subjected to a high potential for injury and death upon their entry into The Common and the intersecting corridors.

Exit access corridors and other means of egress components are subject to strict interior-finish requirements to limit flame spread, fuel contribution, and smoke production. Even with such interior-finish controls, storage of items such as outerwear on coat racks can provide fuel loading and fuel configurations that may provide for intense and rapid fire build-up upon ignition. In this fire, fuel provided by the clothing on the coat rack was a factor in initial fire growth and development.¹¹

Certain corridor configurations, which allow the build-up of heat with subsequent heat radiation to the surfaces of interior finish, furnishings, and floor materials, can result in extremely rapid spread of products of combustion and fire.^{12,13}

Interior finish that meets small-scale laboratory test requirements (as opposed to full-scale tests) may provide

¹¹ James R. Bell, "Fifteen Residents Die in Mental Hospital Fire," FIRE JOURNAL, Vol 73, No. 4 (July 1979), pp. 68-76.

¹² Richard G. Bright, *Beverly Hills Supper Club Fire, Southgate, Kentucky, May 28, 1977, An Analysis of the Development and Spread of Fire from the Room of Fire Origin (Zebra Room) to the Cabaret Room*, Center for Fire Research, National Bureau of Standards, Washington, D.C., September 1, 1977.

¹³ *Interior Finish and Fire Spread*, NFPA SPP-47, NFPA, Quincy, Mass., 1977, pp. 113-140.

Wall area at the south end of The Common at the intersection with the South Corridor seen at right. Pattern and effect of one of the four domestically fed sprinkler heads (top) is clearly shown. NFPA



for continued propagation of fire with contribution to heat and smoke conditions. As previously discussed, the vinyl wall-covering sample test results by the National Bureau of Standards appeared to fall within the range of values for Class A interior finish.

The influence of intense thermal energy from fire on interior-finish materials, including vinyl wall coverings, has been identified as a factor in both fire spread and smoke production. Delamination, melting, and subsequent burning of vinyl wall coverings has been reported in recent studies of other hotel fires.^{14,15} This phenomenon was again observed in the corridors at the Stouffer's Inn, and the vinyl wall covering may have contributed to fire and smoke spread during the initial stage of the fire.

This fire emphasizes the importance of sufficient means of egress from places of assembly that can provide a protected path to the safety of the exterior of the building, and that can provide paths of travel meeting the requirements of the concept of "remoteness." Where

direct exits to the exterior are not provided, this fire illustrates the importance of maintaining the integrity of exit access areas within a building.

If the conference facility building, including all places of assembly areas, had been protected with a complete automatic sprinkler system, the potential for injury or death of the occupants would most likely have been greatly reduced. Because of the critical location of the fire in the exit access corridors, smoke and heat conditions in those exit access areas would have existed even with complete sprinkler protection. However, once the system had activated, the ambient conditions of heat and smoke would most likely have remained at levels that would have enhanced the potential for survival of the meeting-room occupants.¹⁶

Chapter 8, "New Places of Assembly," in the 1981 Edition of *The Life Safety Code*® requires automatic sprinkler protection in Class A (1,000 or more persons) and Class B (300 to 1,000 persons) places of assembly.¹⁷

¹⁴ David P. Demers, "Familiar Problems Cause 10 Deaths in Hotel Fire," FIRE JOURNAL, Vol. 74, No. 1 (January 1980), pp. 53, 55.

¹⁵ John Bouchard, "Kearney, Nebraska, Holiday Inn Fire, January 16, 1981," NFPA (unpublished).

¹⁶ See NFPA 101, *The Life Safety Code*, for specific requirements and exceptions.

¹⁷ Reg. TM, The National Fire Protection Association, Inc.

¹⁷ See NFPA 101, *The Life Safety Code*, for specific requirements and exceptions.

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